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**CLAIM AMENDMENTS:**

1. (Original) A method comprising:  
accessing a first multi-dimensional graphical matrix representation that describes the appearance of a plurality of points of an object from a plurality of viewing directions, the appearance varying from point to point and viewing direction to viewing direction;  
creating a second graphical representation that approximates the first graphical representation and that includes at least one expression having a fewer dimensions than the first multi-dimensional graphical representation by decomposing the first multi-dimensional graphical representation into the second graphical representation, the decomposing including sign consistent matrix factorization to selectively represent information from the first graphical representation.
2. (Original) The method of claim 1, wherein the sign consistent matrix factorization comprises non-negative matrix factorization.
3. (Original) The method of claim 1, wherein the sign consistent matrix factorization comprises alternating sign matrix factorization.
4. (Original) The method of claim 1, further comprising:  
accessing a third multi-dimensional graphical representation that describes the appearance of a second plurality of points of the object from a plurality of viewing directions, the second plurality of points including the first plurality of points, and the appearance varying from point to point and viewing direction to viewing direction; and  
partitioning the third multi-dimensional graphical representation into a plurality of smaller multi-dimensional graphical representations each associated with a primitive of a polygonal representation of the geometry of the object, the plurality of smaller multi-dimensional graphical representations including the first multi-dimensional graphical representation.

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5. (Original) A machine-readable medium having stored thereon data representing sequences of instructions that when executed cause a machine to perform operations comprising:

access of a first multi-dimensional graphical matrix representation that describes the appearance of a plurality of points of an object from a plurality of viewing directions, the appearance varying from point to point and viewing direction to viewing direction; creation of a second graphical representation that approximates the first graphical representation and that includes at least one expression having a fewer dimensions than the first multi-dimensional graphical representation by decomposing the first multi-dimensional graphical representation into the second graphical representation, the decomposing including sign consistent matrix factorization to selectively represent information from the first graphical representation.

6. (Original) A machine-readable medium of claim 5 having stored thereon data representing sequences of instructions that when executed cause a machine to perform operations comprising a non-negative matrix factorization when performing the sign consistent matrix factorization.

7. (Original) A machine-readable medium of claim 5 having stored thereon data representing sequences of instructions that when executed cause a machine to perform operations comprising an alternating sign matrix factorization when performing the sign consistent matrix factorization.

8. (Original) A machine-readable medium of claim 5 having stored thereon data representing sequences of instructions that when executed cause a machine to perform operations comprising

access of a third multi-dimensional graphical representation that describes the appearance of a second plurality of points of the object from a plurality of viewing directions, the second plurality of points including the first plurality of points, and the appearance varying from point to point and viewing direction to viewing direction; and

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partition of the third multi-dimensional graphical representation into a plurality of smaller multi-dimensional graphical representations each associated with a primitive of a polygonal representation of the geometry of the object, the plurality of smaller multi-dimensional graphical representations including the first multi-dimensional graphical representation.

9. (Canceled) Please cancel Claim 9 without prejudice.
10. (Canceled) Please cancel Claim 10 without prejudice.
11. (Canceled) Please cancel Claim 11 without prejudice.
12. (Canceled) Please cancel Claim 12 without prejudice.
13. (Original) A system comprising  
a hardware module that accesses a first multi-dimensional graphical matrix representation that describes the appearance of a plurality of points of an object from a plurality of viewing directions, the appearance varying from point to point and viewing direction to viewing direction;  
a matrix multiplication module in the hardware module that computes a second graphical representation that approximates the first graphical representation and that includes at least one expression having a fewer dimensions than the first multi-dimensional graphical representation by decomposing the first multi-dimensional graphical representation into the second graphical representation, the decomposing including sign consistent matrix factorization to selectively represent information from the first graphical representation.
14. (Original) The system of claim 13, wherein the sign consistent matrix factorization comprises non-negative matrix factorization.
15. (Original) The system of claim 13, wherein the sign consistent matrix factorization comprises alternating sign matrix factorization.

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16. (Original) The system of claim 1, further comprising:  
a submodule of the hardware module that accesses a third multi-dimensional graphical representation that describes the appearance of a second plurality of points of the object from a plurality of viewing directions, the second plurality of points including the first plurality of points, and the appearance varying from point to point and viewing direction to viewing direction; and further partitions the third multi-dimensional graphical representation into a plurality of smaller multi-dimensional graphical representations each associated with a primitive of a polygonal representation of the geometry of the object, the plurality of smaller multi-dimensional graphical representations including the first multi-dimensional graphical representation.